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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 09/963,638  | 09/27/2001  | Daewon Kwon          | 178.39931X00        | 9281             |
| 20457   | 7590        | 03/16/2004           | EXAMINER            |                  |
| ANTONELLI, TERRY, STOUT & KRAUS, LLP<br>1300 NORTH SEVENTEENTH STREET<br>SUITE 1800<br>ARLINGTON, VA 22209-9889 |             |                      | STOCK JR, GORDON J  |                  |
|   |             |                      | ART UNIT            | PAPER NUMBER     |
|   |             |                      | 2877                |                  |

DATE MAILED: 03/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/963,638

**Applicant(s)**

KWON, DAEWON

**Examiner**

Gordon J Stock

**Art Unit**

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 13-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12; 24, 25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>20010927; 20030614</u> .  | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION*****Election/Restrictions***

1. Applicant's election with traverse of **claims 1-12 and 24-25** in Paper No. 20040120 is acknowledged. The traversal is on the ground(s) that the method claims are subcombination and combination. Examiner agrees that they are subcombination and combination: Inventions II and I are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because scattering is not necessary as part of the fitting parameter's calculation. The subcombination has separate utility such as in spectrophotometry, reflectometry, ellipsometry, and scatterometry. As for the method claims, two-way distinctness has been shown, and the claims have a separate classification in the art. In addition, any errors in the restriction of the apparatus claims were not distinctly and specifically pointed out.

Therefore, the requirement is still deemed proper and made FINAL.

2. **Claims 13-23** are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 20040120.

***Specification***

3. The last sentence of the specification on page 18 is objected to for claims are not appended in the disclosure. Correction is required.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. **Claims 1-12** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, in regards to **claim 1**, the claim lacks a positive method step; in addition, the claim lacks an improvement. The supposed improvement modifies the at least one physical parameter and not the method of calculating. So it is unclear as to what encompasses the improvement step of the method of calculating at least one physical parameter of a film.

**Claims 2-12** are rejected for being depended upon rejected claim 1.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 1-6, 11, 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Jellison et al. ("Parameterization of the optical functions ... interband region")** in view of **Adachi ("Optical dispersion relations for Si and Ge")** further in view of **Halliyal et al. (6,563,578)**.

As for **claims 1-6, 11, 12**, Jellison in a method of parameterization of optical functions discloses the following: calculating physical parameters of films in view of interband states (col. 1, paragraphs 1-2). As for scattering, he implies scattering by mentioning surface roughness.

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However, Adachi in optical dispersion relations for Si discloses that optical functions are dependent upon indirect band gap transitions, dispersion mechanisms (col. 1, paragraphs 1-2; col. 2, paragraph 2). And Halliyal in a thickness measurement teaches that optical properties are related to scattering (col. 10, lines 7-30). Therefore, it would be obvious to one skilled in the art at the time the invention was made to have the calculating at least one physical parameter of a film comprise scattering related to interband states, for interband transitions affect optical functions of films.

Also Jellison discloses the physical parameter is an optical property of the film: film thickness, dielectric functions, etc. (col. 1, paragraph 1). And Jellison discloses the extinction coefficient of film (col. 1, paragraph 3). And Adachi teaches the extinction coefficient and refractive index come from the dielectric function calculated (col. 6: B. Optical Constants). And Halliyal discloses the dependence of optical properties on thickness, refractive index, and absorption coefficient (col. 10, lines 18-20). Adachi and Halliyal have the refractive index and extinction coefficient calculated. And Jellison uses models (col. 5, paragraph 1). And Jellison suggests quantum mechanical transition equations for energies are utilized in other expressions (equations 2-4). And Adachi teaches the use of transitions (col. 2, paragraph 1). Jellison states the interpretation of semiconductive materials (abstract). As for impurities, Jellison suggests that defect absorptions will affect calculations (col. 6, paragraph 2). And Adachi teaches analyzing perturbation-induced effects (col. 14, paragraph 1).

8. **Claims 7-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Jellison et al.** (“**Parameterization of the optical functions ... interband region**”) in view of **Adachi**

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**(“Optical dispersion relations for Si and Ge”)** further in view of **Halliyal et al. (6,563,578)**

and in view of the disclosure of the applicant.

As for **claims 7-10**, **Jellison** in view of **Adachi** and **Halliyal** discloses everything as above (see **claim 6**). As for **claim 7**, they are silent concerning the specific dielectric function. However, applicant's disclosure of page 11 teaches a prior art equation of **Bourgoin** (page 11, lines 5-10). Therefore, it would be obvious to one skilled in the art at the time to use this specific equation, for it takes into account interband transitions. As for **claim 8**, they are silent concerning the specific dielectric function. However, applicant's disclosure states that the equation is from the **Kramer Konig** relation (page 11, lines 11-15). And **Jellison** mentions using **Kramers-Kronig** integration (cols. 2-3). Therefore, it would be obvious to one skilled in the art at the time to use the specific dielectric function, for **Kramer Konig** integration is used and the parameterization takes into account interband transitions. As for **claim 9**, **Adachi** appears to use the relations of **n** and **k** without SI units (equations 23 and 24). As for **claim 10**, **Jellison** states the use of spectroscopic ellipsometry (col. 1, paragraph 1).

9. **Claims 24-25** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Zawaideh (5,999,267)** in evidence of **Jellison et al. (“Parameterization of the optical functions ... interband region”)** in view of **Adachi (“Optical dispersion relations for Si and Ge”)** further in view of **Halliyal et al. (6,563,578)**.

As for **claims 24-25**, **Zawaideh** in a nondestructive optical technique discloses a system that gathers reflectometric and ellipsometric data (Figs. 1-2; col. 1, lines 50-65; col. 2, lines 1-30); whereas, the system comprises a computer for calculating at least one parameter of the film using measured data and a model by referring to **Jellison's** article and the system measures an

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optical property containing interband states (col. 3, lines 10-25; col. 4, lines 30-65). As for scattering, Jellison implies scattering by mentioning surface roughness (col. 1, paragraph 1). However, Adachi in optical dispersion relations for Si discloses that optical functions are dependent upon indirect band gap transitions, dispersion mechanisms (col. 1, paragraphs 1-2; col. 2, paragraph 2). And Halliyal in a thickness measurement teaches that optical properties are related to scattering (col. 10, lines 7-30). Therefore, it would be obvious to one skilled in the art at the time the invention was made to have the calculating at least one physical parameter of a film comprise scattering related to interband states, for interband transitions affect optical functions of films.

#### ***Fax/Telephone Numbers***

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

- 1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and
- 2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

*Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (703) 872-9306*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431. The examiner can normally be reached on Monday-Friday, 8:00 a.m. - 4:30 p.m.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

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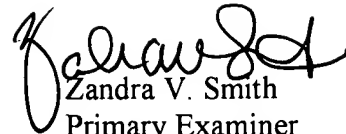
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March 3, 2004



Zandra V. Smith  
Primary Examiner  
Art Unit 2877